

**Summary Minutes of the U.S. Environmental Protection Agency  
Science Advisory Board (SAB)  
Clean Air Scientific Advisory Committee (CASAC)  
National Ambient Air Monitoring Strategy (NAAMS) Subcommittee  
Public Meeting and Teleconference  
July 8-9, 2003 – Research Triangle Park, NC**

Panel Members: See Roster (Attachment A)

Date and Time: 9:00 a.m. to 5:00 p.m. EDT, Tuesday, July 8, 2003  
9:00 a.m. to 12:00 p.m. EDT, Wednesday, July 9, 2003

Location: U.S. Environmental Protection Agency  
EPA Campus, Building C, Room C111-C  
Research Triangle Park, NC

Purpose: For the NAAMS to review EPA's Draft National Ambient Air Monitoring Strategy.

Attendees:

Chair:	Dr. Philip Hopke
CASAC Members:	Mr. Richard Poirot Dr. George Taylor
Consultants:	Dr. Praveen Amar Mr. Craig Beskid Mr. Bart Croes Dr. Kenneth Demerjian Dr. Rudolf Husar Dr. Armistead Russell Dr. Roger Tanner Dr. Warren White
SAB Staff:	Mr. Fred Butterfield Dr. Vanessa Vu

Other Persons Attending: *(in order of their appearance on the agenda)*

Dr. Rich Scheffe, OAR/OAQPS Monitoring and Quality Assurance Group  
Mr. Mike Gilroy, STAPPA/ALAPCO Representative  
Other EPA personnel and members of the public, as noted on the sign-in sheets (Attachment B).

## Meeting Summary

The meeting generally followed the schedule presented in the meeting agenda, with some modifications. (Attachment C) The meeting adjourned at 5:00 p.m. on Tuesday, July 8, and at 12:05 p.m. on Wednesday, July 9.

## **Tuesday, July 8, 2003**

### Convene Meeting; Call Attendance; Introductions and Administration

Mr. Fred Butterfield, Designated Federal Officer (DFO) for CASAC, convened the meeting at 9:00 a.m. He noted that as a FACA meeting, a telephone line was available for members of the public who wished to participate by telephone, and that public comment periods have been built into the agenda. Mr. Butterfield noted that all members of the National Ambient Air Monitoring Strategy (NAAMS) Subcommittee had been approved by EPA's Office of General Counsel regarding conflict of interest and impartiality. He welcomed participants, noted that Dr. David Diaz-Sanchez and Dr. Ken Demerjian had been delayed due to inclement weather, and introduced CASAC and Subcommittee Chair Dr. Phil Hopke, who asked panel members and the audience to introduce themselves for the record.

### Welcome and Opening Remarks

Dr. Vanessa Vu, SAB Staff Office Director, welcomed panel members and participants to the meeting. She thanked the distinguished members of the Subcommittee for their time and effort, noted that she looked forward to their discussion and deliberation at the meeting, and thanked Agency officials for their efforts and work.

### Purpose of Meeting

After thanking the participants and commending EPA for holding the meeting, Dr. Hopke called NAAMS a good example of excellent initiative on the part of the Agency to provide a comprehensive view of how it is "doing business." He said that NAAMS is important from a multitude of perspectives, including protection of public health, critical input for risk assessment, and management strategy development. The Subcommittee will provide constructive comments to EPA's Office of Air Quality Planning and Standards (OAQPS) to strengthen the document, allowing OAQPS to move ahead with the implementation of NAAMS, and will quickly prepare a review document after this meeting, Dr. Hopke said.

### Presentation on EPA's Draft National Ambient Air Monitoring Strategy (NAAMS)

Dr. Rich Scheffe, of EPA's Office of Air and Radiation (OAR)/OAQPS Monitoring and Quality Assurance Group, began his talk with a review of the basics of national monitoring networks. (Slides, Attachment D) Their classic use is in establishing attainment and nonattainment areas, and secondarily, in getting information to the public. Dr. Scheffe said that he would discuss whether the data from the networks also support other objectives. There are several national networks, for which the Agency provides overall guidance, and for which state and local agencies and tribes conduct monitoring; it is a very dynamic partnership, Dr. Scheffe said.

NAAMS has its roots in classic resource management issues, beginning about three years ago. The networks were designed in the 1970s, when there were major criteria pollutant problems, and have not been significantly rethought since then, Dr. Scheffe noted; a major part of the network is still based on identifying the highest concentrations of major components. Many physical and chemical interrelationships in the atmosphere are not considered in monitoring, and the networks are not integrated.

Dr. Scheffe reviewed the principal recommendations of NAAMS, including having insightful measurements to ensure the money allocated for emissions reductions is used effectively; advancing multiple pollutant monitoring; incorporating technological advances; and establishing better connections. The National Core Network (NCore) is proposed as a revision of the national monitoring networks, with an emphasis on multipollutant monitoring. Key principles of NAAMS include: partnership with grantees; balance between national and local needs; and near zero sum assumption in resources (i.e., better optimization and working within rational constraints).

Dr. Scheffe noted that quality assurance issues are hard to separate from air monitoring and that data quality objectives need to change as the kind of data being collected changes. He then reviewed the underlying process structure for NAAMS, and noted the dynamic interactions among the elements of NAAMS, e.g., review, assessment, and evaluation occur iteratively over time.

Network assessments emphasize the value of current networks and focus on process to take an objective view of the networks' value. Assessment work occurs in partnership with regional offices and state and local agencies, Dr. Scheffe said. The initial National Assessment will catalyze regional work and provide a reference and data source. Dr. Scheffe summarized the results of the National Assessment. For ozone, there were limited, i.e., up to 30 percent, reductions nationally (with an attendant redistribution to rural/regional areas that exhibit spatial gaps), which was contrary to past belief. Using Federal Reference Method (FRM) methodology, PM<sub>2.5</sub> network could undergo moderate reductions with an attendant increase in continuous PM<sub>2.5</sub> monitors. PM<sub>2.5</sub> appears to be "well-behaved" in many areas of the country, acting as a regional pollutant and behaving like a gas. For PM<sub>10</sub>, CO<sub>2</sub>, NO<sub>2</sub>, and SO<sub>2</sub>, major network reductions for the purpose of National Ambient Air Quality Standards (NAAQS) comparisons were appropriate, again with an attendant shift toward of these instruments to more representative

locations utilizing highly resolved methods to support a spectrum of air program support needs (e.g., model evaluation, accountability of control programs, source apportionment and health effects studies). Monitoring for lead showed that reduction efforts have been highly successful and large-scale monitoring is no longer an issue, Dr. Scheffe said.

Dr. Scheffe then discussed the design of the National Core Network (NCore), the goal of which is to move from loosely-tied single-pollutant networks to coordinated, highly-leveraged multi-pollutant networks with real-time reporting capability. The principal data objectives are public information, health/exposure assessment support, emissions strategy planning, air quality trends and program accountability, science support, and NAAQS determinations and related regulatory requirements. Because the data needs that drive emissions strategy planning are different from the needs that drive long-term tracking, NCore may not meet all these needs, Dr. Scheffe commented, but it will provide some structure and a basis for expansion due to its commonality of measurements.

The levels of measurement under NCore can be represented as a pyramid. Level 3, at the base, consists of a multitude of sites, to meet the continuing need for individual sites (e.g., to measure ozone and PM<sub>2.5</sub>). Level 2 consists of a formalized set of multipollutant measurement sites across the country. Level 1 is a smaller number of “master sites” with comprehensive measurements and advanced methods, and recognizes the need for communication between research and application. NCore operates under the assumption that multiple measurements provide a synergistic addition to the interpretive value of data sets, Dr. Scheffe said.

Dr. Scheffe discussed the proposed siting approach for Level 2 NCore sites. The planned “representative locations” will start with reasonable coverage from the health/exposure perspective, and add in rural coverage for accountability and operational model evaluation. The existing PM<sub>2.5</sub> networks provide a good starting point; future directions include increasing coverage of multiple pollutants. There will be further integration and optimization for NCore and NAAMS, to meet the longer term goal of an integrated complex of observation and monitoring.

Dr. Hopke invited brief questions from the panel. Dr. Praveen Amar asked what the Subcommittee’s impact would be. Dr. Scheffe commented that regulations were not the major driver of NAAMS. Dr. Hopke said that the Subcommittee probably should not get involved in detailed policy issues related to regulation, which are outside the purview of the SAB, and should focus on whether NAAMS accurately reflects the science.

At 10:40 a.m. the meeting adjourned for a break until 11:00 a.m.

#### STAPPA/ALAPCO Remarks

Mr. Mike Gilroy, Co-Chair of the State and Territorial Air Pollution Program Administrators

(STAPPA)/Association of Local Air Pollution Control Officials (ALAPCO) committee, provided a state and local agency perspective on NAAMS, which he termed an exciting step forward in monitoring of the nation's air quality. He remarked on the inclusive nature of the work groups and the Agency's broad consideration of information during its development, and said that the Agency has been extremely flexible in listening to state and local ideas. Mr. Gilroy said he had a strong sense that state, local, and tribal agencies are ready to move forward with NAAMS.

NAAMS is important because those agencies need new suites of readily accessible public products, Mr. Gilroy stated, and they cannot simply rely on databases for air monitoring information. There is a need for products that describe past, present and future air quality indices with higher resolution. The stable yet dynamic nature of NAAMS is a key feature, Mr. Gilroy said. EPA must consider issues such as developing new monitoring methods, sustainable funding, and technology transfer. Each of the layers in the monitoring strategy is critical, Mr. Gilroy remarked, but there is also a fourth layer, namely monitoring activities that are purely state or purely local and respond to local communities, which needs to be recognized.

Mr. Gilroy then provided his perspective on the different levels of NCore. Level 3 is most important to meeting state and local needs, and the needs of organizations like the American Lung Association, he said. It will also capture maximum concentrations in airsheds and best support mapping needs. Level 2 uniquely allows much of the nation to be evaluated in a new way that will provide large-scale exposure information at the urban level. It also has the potential for advancing knowledge of regional conditions, and could provide the basis for future forecasting tools linking models with weather data. Level 1 is representative of the on-going need to do better work. It will provide new tools for more sophisticated monitoring efforts in the future, and also provide a stimulus to foster new development of tools.

Mr. Gilroy said that monitoring regulation changes are essential to make NAAMS work. State and local agencies are hampered by current regulations in moving away from monitoring that does not add value, he said. Mr. Gilroy pointed to a clear overlap with air toxics monitoring, especially regarding toxic fine particles. He said that it is imperative that EPA continue funding air toxics monitoring, as well as long-term funding to sustain monitoring networks so that state, local, and tribal entities can fulfill the requirements of the strategy. More complex work will be expected with its implementation, he said, and the cost of monitoring is likely to rise.

Probably the most critical issue related to the success of NAAMS is also the most problematic, Mr. Gilroy said, namely, information technology transfer. Systems to take data from the monitor, move them seamlessly through EPA to state and local organizations and then to the public are needed. Mr. Gilroy urged the Subcommittee to comment on this issue, even though it appears not to be related to monitoring and not to be scientific.

Dr. Hopke asked Mr. Gilroy to clarify the information transfer problem. Mr. Gilroy said that

the backbone of the data reporting system for air monitoring has had great investment and advancement. However, he hears feedback that it is unfriendly to use, especially in getting data out. Mr. Gilroy would like to see the idea fostered within EPA that it needs to connect the monitors and to make one system with real-time reporting and easy access to data. Dr. Hopke asked about the context in which data would be communicated to the public; Mr. Gilroy responded that the public seems to best understand simplified characterizations like “good,” “moderate” or “bad,” rather than units like ppm. He noted that a shortfall of this approach is the lack of descriptors for shorter averaging periods.

#### Regional EPA Perspective on NAAMS

Mr. Mike Rizzo, of the Air Monitoring Section, Air and Radiation Division, Region 5, stated that his Region has concentrated on the big regional pollutants, namely PM<sub>2.5</sub> and ozone, and has allowed the states to work on other criteria pollutants. (Slides, Attachment E) He reported on a correlation analysis using all available AIRS data for FRM PM<sub>2.5</sub>. Decision criteria (e.g., correlation, monitor density, mean concentration, population change) were developed to determine the value of existing monitors; for instance, if a monitor was highly correlated with another, close to another geographically, had low mean measurements, and was in an area with decreasing population, its value would be low.

An ozone analysis to determine redundant monitoring sites and preserve unique sites, using positive matrix factorization, was also conducted. The state of Michigan wanted to cut its network of ozone monitors in half, Mr. Rizzo said, and the analysis showed sites where information would be lost if the monitor were dropped. Based on the analysis, the state decided to reassess its plan.

Mr. Rizzo expressed the hope that EPA’s top-down approach will meet with the states’ bottom-up approach, and that changes can be implemented over five years. Assessment of networks resulting in initial revisions has been completed, followed by review by technical and regulatory staff at the regional and the state level to see if data needs are met. Approval of the proposed networks by the State Air Directors is now underway, and will be followed by outreach to the public to explain the changes.

#### Internal EPA Perspectives on NAAMS Program Policy, Health Effects and Atmospheric Sciences

Mr. Joe Paisie, Leader, Integrated Policy and Strategies Group, OAQPS, reviewed one of the main uses of NAAMS by the implementation program. (Slides, Attachment F) He pointed out that the definition of “nonattainment area” in the Clean Air Act is unclear, using words like “contribute,” “area,” and “nearby” that are themselves not defined. EPA’s designation guidance attempts to give the states a sense of how to look at the monitoring network and how to define air quality problems for development of a plan to bring the area into attainment with the

standards. There is tension between interpretation of the data and what makes sense from a scientific standpoint, and legal and political aspects, Mr. Paisie said.

EPA has tried to provide designation factors, including the presumption from a policy standpoint that an entire consolidated metro area is affected if there is a monitored violation in any county. Other factors that may be considered include the air quality in the area, in adjacent areas, and in the region, emission sources, population and urbanization, meteorology, geography and topography, jurisdictional boundaries, regional emission reductions, and other information. Mr. Paisie said that the end result is that many metropolitan areas have common particulate matter (PM) and ozone problems and still have to go through the designation process. The states' proposed response is due in July 2003, and EPA expects the entire gamut of recommendations. In terms of developing a monitoring strategy, Mr. Paisie said, if the definition of nonattainment gave scientific standards or an analytical format, it would not take as much time to provide guidance, etc.

Mr. Paisie discussed a map of counties with monitors showing violations (i.e., nonattainment), and a map of metro areas with monitors showing violations. The latter incorporates more population and bigger geographic areas, but pushes the boundaries, because there is not a monitor in every designated county. Many violations are close to the standard, he said.

Dr. Hopke asked if changing the definition would require an amendment to the CAA; Mr. Paisie said it would. Dr. Warren White commented that the definition is meaningless if "area" is not defined. Dr. Rudolf Husar inquired if there was a move toward a data-analysis-based approach to defining areas in exceedence, such as spatial analysis. Mr. Paisie said that it is a conceptually sound approach, but judgment is still involved, and that the approach needs to be "sold" to policy makers.

At approximately 12:10 p.m., the meeting adjourned for lunch, to resume at 1:00 p.m.

#### Internal EPA Perspectives on NAAMS Program Policy, Health Effects and Atmospheric Science (continued)

Dr. Ken Schere, National Exposure Research Laboratory (NERL), noted that ORD laboratories were asked about a year and a half ago to review the NAAMS. NERL uses air quality data to evaluate models and address accountability, e.g., to signal changes from large-scale emission control efforts. Dr. Schere said that the Level 2 network, with 70 to 100 proposed sites conducting continuous measurements, would be very useful to NERL, which relies on that type of measurement for its diagnostic work. The data will be a good backbone for model evaluation and some accountability issues. Dr. Schere commented that VOC monitoring appears to be weak, with a subset of mostly urban sites; sampling in some rural areas, especially areas with high biogenic VOCs, would be useful. Formaldehyde, which is important for model evaluation, is only measured at a subset of sites, and rural measurements would be useful. The basic

meteorological measurements taken at Level 2 sites may be sufficient, but a measure of surface radiation would also be helpful.

Generally, more rural and upwind sites in the network would be useful in characterizing regional transport into urban areas and detecting the signal of NO<sub>x</sub> emission reductions following major control projects. Continuous or semi-continuous measurements are better for modeling, process-related studies provide input for models, and speciation of PM<sub>10</sub> would be very useful strategically, Dr. Schere said. Characterization of uncertainty is important for modelers using data and uncertainty is not the same for all the measurements under discussion.

The Level 1 sites are an important network for instrument testing and development, Dr. Schere noted. Some of the measurements are critical; it would be good to have them in Level 2 as soon as practical. The Level 3 sites are the backbone of the ozone network, and the data are needed for operational model evaluations. Overall, NCore is strategically important, Dr. Schere commented; it helps integrate other networks, extends the range of pollutants measured, and will help regarding model evaluation.

Dr. Husar asked about boundary analysis and intermittent sources, such as fires. Dr. Schere said that boundary models are generally continental, with boundaries specified by climatology and satellite data. For intermittent sources, like wildfires, satellite data will help address the problem, and the PM speciation network will detect speciation from the events.

Dr. White asked who in the Agency, in addition to modelers, used vertically resolved data. Dr. Scheffe said that the data are being used more for forecasting than in the past, and that better integration with NOAA was needed. Dr. Hopke commented that the data were likely to become more important. Dr. Scheffe agreed, and noted that OAR and other parts of the Agency are getting involved in the global perspective.

#### NHEERL Perspectives on NAAMS

Mr. Bill Russo, the Assistant Lab Director for Air at NHEERL, stressed the importance of good coordination with OAQPS in doing health research to evaluate the NAAQS. (Slides, Attachment G) He noted that NHEERL had input to NAAMS, e.g., papers by Lucas Neas on the use of air quality monitoring in support of epidemiology. Population considerations in epidemiology mean that adequate assessment is important, Mr. Russo said. Studies have relied on routinely-collected air quality monitoring data and researchers need sufficient geographic detail to permit long-term community-level exposure estimates. Mr. Russo then summarized the differing exposure assessment needs, e.g., in frequency, duration, and/or geographic scope, of different types of epidemiologic studies. Focusing on PM, he said that daily measurements are the most useful for health studies, and that hourly monitoring data are particularly useful for panel studies. Also of use is the temporal and spatial capability of using a monitoring system and coupling it with models to impute data between monitors or when there are less frequent measurements.



Strong communications among agencies and scientists are needed regarding the decommissioning of monitoring sites, Mr. Russo said. A link between health scientists and decision makers is needed, as is a clearinghouse for information and more coarse particle measurements to support health studies. The proposed speciation data from selected sites will be valuable for epidemiological studies to evaluate hazardous PM components. Incorporation of air toxics sites is welcomed. Mr. Russo also noted the capacity for integrated PM measurements, the value placed on filter-based measurements, and the capacity for important high-volume PM sample collection. The Level 2 and 3 sites are of the greatest value for health studies, Mr. Russo said, and the Level 1 sites will provide measurement insights.

Dr. Russell commented that the Level 1 site provides an ongoing basis for information over time. Mr. Russo said that some data needs aligned with Supersites, and that more integrated measurements are of greater value. Dr. Scheffe noted that, in some cases, the sites are long-lived, and that type of data would be useful to health researchers.

Dr. Amar asked if daily measurements of PM are still regarded as more useful, or whether shorter duration measurements, e.g., 3 to 6 hours, are preferred. Mr. Russo said that daily measurements are useful for long-term studies, while hourly data are used in studies of acute responses. It is not clear, he said, what the best measure is.

Dr. White asked about the importance of maintaining the capacity for high-volume integrated PM measurements. Mr. Russo said that sufficient quantities of particle mass are needed for toxicological studies. Dr. Scheffe said that such data would not be routinely collected by the states, but that researchers could upgrade the capacity of sites to collect more data.

Dr. Demerjian inquired whether EPA has examined speciation data to determine if they are providing the necessary level of detail. Mr. Russo said that EPA has not comprehensively looked at the available data from the speciation network. Dr. Russell asked about a reference in the NAAMS to PM data at the minute level; Dr. Hopke noted this level of resolution seemed high to support exposure assessment, and asked if it would be used in research. In discussion, the issue of getting real-time data for telemetry during events like forest fires was raised. Dr. Demerjian called on EPA to be explicit about this issue. A participant recommended that the Subcommittee comment on data periods of less than an hour in its written report.

#### CASAC NAAMS Subcommittee Discussion and Deliberations

Dr. Hopke reviewed the charge to the Subcommittee. He then suggested that the Subcommittee systematically review the NAAMS document chapter by chapter, keeping the charge questions in mind. Following some discussion, the Subcommittee decided to begin with the "Key Objectives" section.

Dr. Hopke commented that the text did not explicitly address the question of tradeoffs among kinds of monitoring. Also, he said, it lays out two different things: what the strategy is supposed to accomplish conceptually and the objectives that the network is supposed to accomplish. After reading the objectives, he invited discussion.

Dr. Roger Tanner said that an explicit description of the new and the old paradigm would be helpful; Dr. Scheffe agreed. He also noted that there was an evening of objectives, a moving away from a strongly regulatory-based network to one that is responsive to the needs of several objectives. Dr. Hopke suggested adding a general statement to the document. Dr. Husar noted that under the new, broader paradigm, EPA can measure things not considered toxic at current levels, and expressed concern that the system might move too fast and not be able to accommodate those changes while producing useful information. Dr. Demerjian agreed, and urged EPA to show that it can do what it is proposing in the NAAMS. Dr. Husar said that transforming the data into a response to the needs must be an integral process. Dr. Tanner commented that it is necessary to know that the right data are being acquired at the right resolution.

Dr. Scheffe asked about the process for getting the data users engaged in parallel with the data being developed. Dr. Hopke commented that there are simply not enough resources to fully satisfy all the users, and suggested that EPA clearly state that there were compromises and the NAAMS provides a basis for compliance, or a starting point for other efforts.

At 2:55 p.m., the Subcommittee adjourned for a 20-minute break.

Following the break, Dr. Hopke initiated discussion on the charge to review the idea of network design, the National Core Network (NCore) laid out in the document. An initial consideration, he said, was the lack of funding for Level 1 sites; he suggested that EPA might consider establishing some Level 2 sites as infrastructure, running some level of daily and continuous sampling, where researchers could add other monitoring as needed. Those Level 2 sites could then become Level 1 sites. Dr. Scheffe commented that working within the infrastructure would pave the way to do more when resources are available.

Dr. White noted that EPA needs an additional key operating principle, in addition to flexibility and partnerships, namely, coordinating in space and among agencies. EPA also needs to preserve the integrity of the monitoring system across time. The Agency's operating principle should be, he said, that no major changes are done to the network without a demonstration of the relationship over time between the new and the old measurements. This requires overlap, which is costly, however. Dr. Demerjian noted that if this is an important issue, then the Subcommittee needs to say something about funding in its report.

Dr. Demerjian said that it is critical that EPA communicate to the public that there has been sufficient quality assurance, and that the data are meeting quality standards, so a rigorous quality

assurance exercise is needed. If EPA “sells” the program as a backbone, to which other programs can be added, EPA needs to show that there are those other programs, there is money to augment, and who is coming in as partners.

Dr. Demerjian asked how EPA was negotiating with the states regarding the Level 2 sites. Dr. Scheffe commented that EPA will be arguing for the reallocation of funds based on the need to move to a more integrated approach to air quality management. Dr. Husar commented that a transition period validating the new network’s quality could also provide a means to start exercising analysis and interpretation and evaluating network performance from several perspectives.

Dr. George Taylor noted that this national strategy was missing any commitment of the Agency to ecological issues, ranging from crops to forests to intrinsic ecological value. Dr. Scheffe agreed, and said that the national scope would have to include ecosystems, and that he would urge the Agency to send the document through another process to bring in ecological needs. Dr. Taylor said that EPA has a mandate to do that and that it needs to be one of the NAAMS objectives.

Dr. Hopke inquired, in terms of explicit investment and disinvestment, if the Subcommittee agreed with the implication in the Strategy that gas monitors are not likely to supply significant information, so funding should go elsewhere, such as air toxics. Dr. Ted Russell noted that a problem with criteria pollutants, is that although levels may be below the “bright line,” health effects do not go away; this should not be a driver for investment and reinvestment, he said. Dr. Hopke asked for the Subcommittee’s opinion of the current generation of gas monitors and the value of continuing those measurements. Dr. Demerjian commented that any problems with the monitors are fixable, and that measurements of SO<sub>2</sub> need to continue to allow tracking the reduction of sulfur in fuels. NO<sub>x</sub> and CO also need to be measured, he said. Dr. Scheffe said that EPA also needs those trace level measurements, and is concerned with the sensitivity and location of the monitors.

Discussion of aspects of the Level 3 sites followed. Dr. Hopke suggested that some Level 3 sites are needed to get good rural CO and NO<sub>y</sub> measurements, since there are not that many Level 2 sites. Dr. Scheffe said that the need could be conveyed as one for interpretive purposes, not for compliance. Dr. Hopke said that the Level 3 sites should be more than PM and ozone sites. Dr. White said that in order to be useful, the sites needed to make measurements that captured both lows and highs. Dr. Hopke asked if 75 Level 2 sites would give the kind of regional coverage needed to answer questions. Dr. Turner recommended that a significant portion of the rural sites should address transport of trace gases.

Mr. Rich Poirot suggested that the distinctions between Level 2 and Level 3 need to be blurred; perhaps the starting point would be the minimum needs for Level 3, followed by what needs to be added at some of the Level 3 sites. Dr. Scheffe agreed that it was a good idea to not have

rigid distinctions between the levels. Dr. Hopke noted that the concept was represented as a pyramid, with gradations between levels.

Dr. Hopke raised the issue of air toxics, which encompasses a wide variety of things. It is not clear how it fits into a national strategy, he said. Also, in terms of the relative amount of potential adverse health effects, it appears that there is no threshold for ozone and PM, although standards have been set to protect the public health with adequate margin of safety. Dr. Scheffe commented that the strategy may have placed too much emphasis on air toxics and that degree of emphasis needs to be revisited.

#### Public Comments

At 4:20 p.m., Dr. Hopke noted for the record that the meeting was open to the public. He clarified that there were no members of the public in the room or on the telephone who wished to comment.

#### Subcommittee Discussion (continued)

Dr. Hopke invited discussion of other aspects of the NCore strategy. Mr. Craig Beskid said that the Level 2 sites are instrumentation sites, and urged consideration of having two of them be instrumentation proving sites, with the remainder being associated with problems specific to a region. This could help develop support for Level 1 sites, and would allow flexibility to move resources to a more topical measurement system. Dr. Hopke agreed that the system needs to be more dynamic.

Dr. Amar noted that the Executive Summary needs a better explanation of technology transfer from Level 1 sites.

Dr. Hopke noted that the assessment process and the role of spatial analysis are part of the explicit charge to the Subcommittee and indicated that he would like to start discussion of those issues. He expressed concern that the NAAMS document did not lay out a specification of how to do the assessment; he recommended that very clear guidance be developed for the various groups as to what tools will be applied and accepted. Dr. Hopke recommended a clearer definition of the governing principles of what will go into assessment processes, and who is responsible for doing, reviewing, and implementing the assessment.

Dr. Taylor commented that EPA underestimated scaling in the NAAMS document, and that it needs parity with modeling. For instance, GIS is the scaling tool of preference, he said, but the Strategy does not indicate how it would be used. He also noted that remote sensing capabilities developed by NASA and NOAA can complement site-specific monitoring. Dr. Scheffe said that the discussion in the NAAMS document is predicated on the good use of scaling techniques, but that the point got lost in the process. Dr. Husar noted that spatial extrapolation techniques are

advanced over temporal techniques. Mr. Poirot commented that there is a *de facto* scaling method in place, namely, the political jurisdiction in which the monitor is located, which relates to how compliance is determined. Discussion followed about how scaling, as modeling, related to extrapolating in time. Dr. Hopke identified the need for sufficient spatial density of data to provide a good basis for extrapolation. Dr. Husar reiterated the need for communication among agencies regarding data.

At 4:55 p.m., the meeting adjourned for the day.

### **Wednesday, July 9, 2003**

#### **Reconvene Meeting; Call Attendance**

At 9:05 a.m., Mr. Butterfield called the meeting to order. He informed the Subcommittee that Dr. Diaz-Sanchez was unable to attend the second day of the meeting due to inclement weather. A brief review of logistical matters followed.

#### **Re-cap of Yesterday's Meeting**

Dr. Hopke briefly reviewed how the Subcommittee would put its report together. He asked the members to get their complete final comments to him by Monday, July 14. He indicated that he would circulate a draft of the report on Monday, July 21. Dr. Hopke acknowledged that this was a relatively short time frame for the comments. A review by the entire CASAC will be scheduled, either by teleconference in early August or as an adjunct to the end of August meeting.

Mr. Beskid inquired whether the Subcommittee could get copies of the presentations given at the meeting; Mr. Butterfield indicated that he had requested them and would provide them to members.

Dr. Amar asked when the Subcommittee would be finished. Dr. Hopke said that it was not yet determined, and Mr. Butterfield indicated that the Subcommittee would not be disbanded, and could be called upon again in the future.

#### **Continue CASAC NAAMS Subcommittee Discussion and Deliberations**

At 9:15, Dr. Hopke initiated discussion about the number and location of Level 2 sites under the NCore proposal. He noted that the NAAMS document describes 70 to 100, or "about 75" sites, of which potentially 25 are rural and 50 urban, referring to a table on page 21. He asked the Subcommittee to consider if the general conceptual balance was a good starting point.

Dr. Demerjian commented that the table needs clarification, and that he assumed one site per

state is associated with an urban area. Dr. Scheffe said that held for most but not all states; for instance, he said, states like the Dakotas would be good candidates for background sites. Dr. Demerjian said that the document was confusing relating to the number of rural sites. Dr. Scheffe said that the intent was to work with the infrastructure, using, in most cases, speciation trends sites, although there is some initiative to establish more rural sites.

Dr. White asked about the tribes, and Dr. Scheffe indicated that there were some opportunities for the tribes to become involved with the rural Level 2 sites, although they were not envisioned to have major roles. Once EPA gets direction from the Subcommittee, he said, serious discussions with the tribes and about funding will begin.

Dr. Amar asked about the number of sites that will be brand new. Dr. Scheffe estimated that it would be less than 10 percent, noting that the focus has been enhancing the inventory of existing sites, rather than starting from new.

Mr. Poirot commented that the rural sites are key to development and model evaluation purposes, and that it would be efficient to site as many rural sites at existing sites as possible. Noting that different methods are being used at different speciation sites, and that there are two definitions of PM speciation, he asked about the degree of standardization of methods desired for the Level 2 sites. Dr. Scheffe replied that the issue of differing methods for PM needs to be raised with the PM subcommittee. Rather than a wholesale change, he said, there might be better technical solutions that would relate to the existing infrastructure. The vision was that the Level 2 sites would be outfitted with similar instrumentation.

Dr. Taylor commented that not having ecological effects “on the table” was a problem, in his opinion, and said that he would not want to consider putting a bound on the number of sites unless the Agency can justify its position regarding ecology. Dr. Scheffe said that he was hearing the message that the scope for the draft was too small, and the objectives list is limited. If this is a national strategy, with coordination and integration with other efforts, ecological welfare effects need to be included, he said. He encouraged the Subcommittee to make that request of EPA.

Dr. White asked Dr. Taylor, as an ecologist, for his opinion on the instrumentation and list of variables for the Level 2 sites. Dr. Taylor said that the most significant uses for the ecological community would relate to ozone and hazardous air pollutants (HAPs), and that PM speciation is less important in many areas. Ecologists need to have the reactive nitrogen component, he said, noting that nitrification is perhaps the most important issue for ecologists at the regional level. Dr. Amar noted that not all ecological sites would be rural, and Dr. Hopke commented that a mix of urban and rural sites would allow assessment of both areas supposed to be pristine and disturbed areas.

Mr. Bart Croes noted that a stated goal of the Level 2 sites is to follow the progress of the

emission control process, and asked if EPA had considered siting one in a traffic island or tunnel. Dr. Scheffe said no, due to the difficulty of meeting too many objectives, and because doing a more focused job on a single objective would lose the ability to use the data for more general purposes. Dr. Demerjian commented that a traffic island or tunnel site could be viewed as a special study, and that the network cannot be designed to do all of those, but to be the backbone on which such studies can be built.

Dr. Hopke then turned the discussion to another charge issue, the utility of performance-based approaches, and asked Dr. Scheffe to elaborate. Dr. Scheffe noted that one of the themes of the Strategy is to promote new technology, but the design requirements do not allow new technology to be brought in. The principal driver for using data quality and performance-based objectives is movement away from design concepts. The staff were asked to look at different approaches to meet the equivalency of methods.

Dr. Hopke commented that the key will be to think carefully about a sufficient level of stringency in the performance-based standard, which gets back to what EPA will need for making regulatory decisions. The process needs to be dynamic, he said; using data quality objectives, one can determine statistically how good the measurements need to be, and manufacturers will make equipment which is that good.

Dr. White commented that performance-based thinking is tied tightly to the Level 1 site capabilities for verifying performance objectives. Dr. Tanner noted that an integral part of putting new technologies in the field is developing the technique of the lab, then evaluating it (when used with a standard operating procedure (SOP)) in the field. Until state and local personnel can work with it in the field, and meet data quality objectives, he said, then a field-deployable method has not been developed. Dr. Scheffe described that kind of effort as a “gap issue,” neither pure research nor pure application. Dr. Tanner said that data quality objectives would not be met without that sort of process.

Mr. Croes asked Dr. Scheffe if he would eliminate the FRM method if he were satisfied that a continuous method were better than FRM. Dr. Scheffe said that he would not, because the differences between the two methods provide information on the changing chemistry of the atmosphere, and need to be looked at over time. Dr. Hopke commented that FRM is reproducibly wrong, but right by regulation. It parallels the data for epidemiology and risk assessment, and the methodology cannot be repositioned until there are sufficient continuous data to re-do the epidemiology. Dr. Scheffe noted that the Level 2 sites are oriented to continuous input and to getting the information out quickly; for PM instruments, co-location for a period of time seems to be the best approach. He said that this kind of input was needed, and that he could take it to the policy people.

Dr. Hopke then raised issues related to training and the more sophisticated methods proposed, inquiring what EPA envisioned in terms of certification or a minimum level of training and

capability in the operators. Dr. Scheffe said that state and local quality assurance leaders had recommended certification, and that EPA is responsible for developing SOPs and quality assurance plans (QAPs). Dr. Hopke pointed out that field staff might find a few days of training far less overwhelming than having to follow SOPs or read QAPs. Dr. Scheffe commented that the Subcommittee could make a recommendation to EPA about this.

The committee adjourned for a break at 10:40 a.m., reconvening at 11:00 a.m.

Dr. Hopke then opened discussion about information exchange. He noted favorable comments about how AIRNOW is working in terms of rapid exchange of information to the general public. He noted, however, that EPA is not required to make its data available to others, although researchers are required to provide their data to the Agency. Dr. Hopke said that a key aspect of the Strategy should be to make the data and the data quality readily available, while recognizing that some users may misuse or misrepresent them.

Dr. Scheffe introduced Mr. Peter Tsirigotis, Director, Emissions, Monitoring, and Analysis Division, OAQPS, to whom Dr. Scheffe reports. He said that issues of data access and availability have been discussed in the agency, and that he agrees completely with Dr. Hopke. Dr. Scheffe said that the Subcommittee could make a pointed recommendation about it to the Agency, which would make clear to management that this is part of the process. The vision with the Strategy is to take AIRNOW to another level. Rather than getting a simple message out to the public, this would be making data available to a range of clients who want to use the data for a variety of purposes.

Dr. Amar said that this was a different level of openness than AIRNOW, so AIRNOW would not be the appropriate model. Dr. Hopke concurred. Mr. Tsirigotis asked if this was the appropriate Subcommittee to consult; Dr. Hopke said it was a good starting point, as its representatives include members who would be using the data. Dr. Taylor recommended getting contributions from information technology to inform the discussion. Mr. Poirot said that there was no need for AIRNOW to be the concept for the proposed approach. Dr. Tanner suggested that AIRNOW and AIRS could be married, to allow an immediate analysis, and then a second level of verification.

Dr. Hopke then turned the discussion to how the Subcommittee should continue. He noted that its membership covers a good cross-section of people who need, use, and are interested in monitoring data, although he would like to see more representation from the health side, e.g., an epidemiologist. He suggested recommending that the Subcommittee stay “in business” and consider meeting periodically to assess the status of the Strategy.

Dr. Demerjian asked what EPA anticipated occurring in the next year or so. Dr. Scheffe said that it would be a dynamic process. He would report on this meeting, noting that the Subcommittee was largely on-board, and then modify the document to reflect Subcommittee



consensus. Strategic planning, e.g., STAG grants, location of sites, etc. would begin. Dr. Demerjian commented that the Subcommittee could provide feedback on the strategic plan, and on the implementation plan. Dr. Hopke said that could be done via teleconference.

Mr. Butterfield remarked that the name of the Subcommittee could be administratively modified so that it did not only address review of the Strategy; that an epidemiologist or other expert could be added to balance the expertise; and that it might serve the interest of CASAC if this Subcommittee merged with the subcommittee on particle monitoring.

Dr. Hopke asked Dr. Scheffe to summarize the points he had taken from the discussion. Dr. Scheffe said that it was his perception that the Subcommittee is conceptually on-board, and is very supportive of EPA's bold initiative. He then listed the elements that the Subcommittee had identified as necessary:

- (1) Dedication to quality assurance. For the Level 2 sites and commonality of data, there is a need to strengthen QA and the training that goes along with it.
- (2) A more assertive link to assessment of monitoring networks. EPA needs commitments from users to get feedback on data strengths and weaknesses, as well as a dynamic process to improve the data in networks.
- (3) Much greater integration is needed, e.g., with NOAA, NASA, the National Park Service, the National Forest Service. This raises many questions regarding management.
- (4) Too much emphasis on air toxics. This reflects the thinking at the highest levels of EPA. The language will be modified, but air toxics will still be integrated with programs
- (5) A link to all the data systems and to the models. This is the time to have better interaction between ambient data and models.
- (6) NCore is a backbone. It does not answer everything without a commitment to special studies. Addressing objectives beyond regulatory objectives has to be balanced with expectations.
- (7) Lack of attention to ecosystem benefits. If this is a national strategy, then ecosystems should be a component, which may mean upgrading of monitoring, etc. This area needs more attention and thinking.
- (8) Scaling, with emphasis on the spatial analysis approach. EPA showed its initial efforts, but did not follow through. He would like to hear strongly that the Agency needs to think creatively about how to use data and how to extract as much use as it can.

#### Summary, Wrap-Up, Next Steps and Closing Remarks

Dr. Hopke noted that the Subcommittee was pleased to have the opportunity to review the Strategy, which is an excellent precedent for the Agency, but that the Subcommittee also offered some suggestions. Starting at the objectives for the Strategy and the network, there was some concern that they were broad and diffuse and not prioritized. The Subcommittee recommended clarification and fewer generalities to improve understanding of the critical foci. Regarding network assessment, the Subcommittee would recommend a formalized assessment, e.g., a

guidance document on how to do a network assessment, the spatial and temporal tools to use, how to put it together to produce information that can be used in decision making.

Dr. Hopke said that the general idea of disinvestment in some monitors to free up resources is reasonable, as is the general structure of NCore. However, he said, the Subcommittee is still interested in CO and SO<sub>2</sub>, which need to be measured with modern tools at current levels to get beyond issues of compliance with the standard. The Subcommittee recommended redeployment rather than elimination of monitors, to extend coverage into more of the nonurban areas. Better geographical coverage (which would eventually provide the basis for ecosystem evaluation, etc.) needs some fine tuning and more information.

Regarding the QA system, Dr. Hopke said that EPA will need to get to the point of a more formal process to set up regular training opportunities for state and local personnel, taking into account staff turnover and changes in technology. Making sure that there is adequate harmonization of results across the multitude of people collecting data will be important for Level 2 sites. Ideally, the Level 2 sites will assist in technology transfer from Level 1, moving research instruments into the field.

Regarding data availability, Dr. Hopke urged EPA to make sure that as it develops the monitoring program, it provides significantly enhanced data for purposes beyond compliance, continuing with the good direction that AIRNOW is taking. To the extent that redundancies can be reduced, and resources saved, it is good, but EPA needs to have both to make the investment in the monitoring program pay off. The goal is not monitoring for the sake of monitoring, but to generate data that can become information.

As to where the Subcommittee is going, Dr. Hopke said that the Subcommittee would be kept together to periodically look at what is happening, e.g., the implementation plan, and to provide input in the process. He said that the Subcommittee looks forward to seeing activity to move the Strategy into the implementation phase as quickly as possible.

#### Public Comment Period

Mr. Butterfield asked if any members of the public had comments; no one in the room or on the phone identified themselves.

#### Adjourn Meeting

Dr. Hopke thanked all for their participation in the meeting. Mr. Butterfield commented that it was his understanding that OAQPS will revise the document in light of the Subcommittee's comments, and asked for an estimate of time. Dr. Scheffe said that was correct, and estimated it would be two months after OAQPS received comments from the Subcommittee. Mr. Butterfield thanked members of the Subcommittee and EPA personnel, and reminded Subcommittee

members to submit their comments to him and to Dr. Hopke by close of business Monday, July 14. Dr. Scheffe also expressed his thanks to participants.

The meeting adjourned at 12:05 p.m.

## **ATTACHMENTS**

Attachment A	Roster of the NAAMS
Attachment B	Sign-in Sheets
Attachment C	Meeting Agenda
Attachment D	Slides, Dr. Rich Scheffe, OAQPS
Attachment E	Slides, Dr. Mike Rizzo, Region 5
Attachment F	Slides, Mr. Joe Paisie, OAQPS
Attachment G	Slides, Mr. Bill Russo, NHEERL

**U.S. Environmental Protection Agency  
Science Advisory Board  
Clean Air Scientific Advisory Committee  
National Ambient Air Monitoring Strategy (NAAMS) Subcommittee\***

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\* Members of this SAB Panel consist of:

a. SAB Members: Experts appointed by the Administrator to serve on one of the SAB Standing Committees.

b. SAB Consultants: Experts appointed by the SAB Staff Director to a one-year term to serve on ad hoc Panels formed to address a particular issue.

c. Liaisons: Members of other Federal Advisory Committees who are not Members or Consultants of the Board.

d. Federal Experts: "Federal Experts" are federal employees who have technical knowledge and expertise relevant to the subject matter under review or study by a particular panel.

**U.S. Environmental Protection Agency  
Clean Air Scientific Advisory Committee (CASAC)  
National Ambient Air Monitoring Strategy (NAAMS) Subcommittee**

**Public Meeting & Teleconference  
Tuesday, July 8, 2003 – 9:00 am to 5:00 pm Eastern Time  
Wednesday, July 9, 2003 – 9:00 am to 12:00 pm Eastern Time**

**EPA campus – Building C, Room C111-C  
Research Triangle Park (RTP) North Carolina**

**Review of EPA's Draft National Ambient Air Monitoring Strategy**

**Final Meeting Agenda**

**Tuesday, July 8, 2003**

9:00 am	<b>Convene Meeting; Call Attendance; Introductions and Administration</b>	Mr. Fred Butterfield, CASAC DFO
9:10 am	<b>Welcome &amp; Opening Remarks</b>	Dr. Vanessa Vu, SAB Staff Office Director
9:15 am	<b>Purpose of Meeting</b>	Dr. Phil Hopke, Chair
9:20 am	<b>Presentation on EPA's Draft National Ambient Air Monitoring Strategy</b>	Dr. Rich Scheffe, OAR/OAQPS Monitoring & Quality Assurance Group
10:30 am	<b>Break*</b>	
10:45 am	<b>STAPPA/ALAPCO Remarks</b>	Mr. Mike Gilroy, STAPPA/ALAPCO Representative
11:05 am	<b>Regional EPA Perspective on NAAMS</b>	EPA Regional Office Representative
11:20 am	<b>Internal EPA Perspectives on NAAMS Program Policy, Health Effects &amp; Atmospheric Sciences</b>	OAQPS & ORD/NHEERL Representatives
12:00 pm	<b>Lunch (Cafeteria)</b>	
1:00 pm	<b>Internal EPA Perspectives on NAAMS Program Policy, Health Effects &amp; Atmospheric Sciences (continued)</b>	ORD/NERL Representative
1:30 pm	<b>CASAC NAAMS Subcommittee Discussion and Deliberations</b>	Dr. Hopke, NAAMS Subcommittee Members

\*Note: Periodic breaks will be taken as necessary and at the call of the Chair.

**Tuesday, July 8, 2003 (continued)**

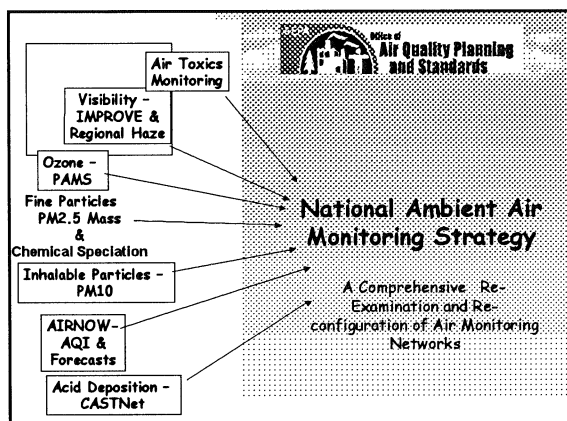
4:15 pm	<b>Public Comment Period</b>	Mr. Butterfield (Facilitator)
4:45 pm	<b>Summary, Wrap-Up and Next Steps</b>	Dr. Hopke
5:00 pm	<b>Adjourn Meeting for the Day</b>	Mr. Butterfield

**Wednesday, July 9, 2003**

9:00 am	<b>Reconvene Meeting; Call Attendance</b>	Mr. Fred Butterfield
9:05 am	<b>Re-cap of Yesterday's Meeting</b>	Dr. Phil Hopke
9:15 am	<b>Additional OAQPS Comments</b>	Dr. Rich Scheffe
9:20 am	<b>Continue CASAC NAAMS Subcommittee Discussion and Deliberations (as required); Report-Writing*</b>	Dr. Hopke, NAAMS Subcommittee Members
11:30 am	<b>Public Comment Period</b>	Mr. Butterfield (Facilitator)
11:45 pm	<b>Summary, Wrap-Up, Next Steps and Closing Remarks</b>	Dr. Hopke
12:00 pm	<b>Adjourn Meeting</b>	Mr. Butterfield

\*Note: Periodic breaks will be taken as necessary and at the call of the Chair.

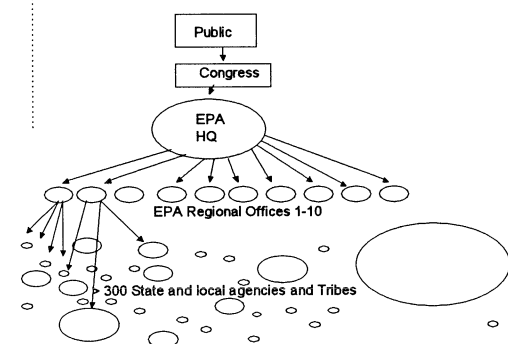




## Agenda

- ◆ Background/Backdrop
- ◆ Background..strategy
- ◆ Network assessments
- ◆ NCORE/design
- ◆ Issues/schedule

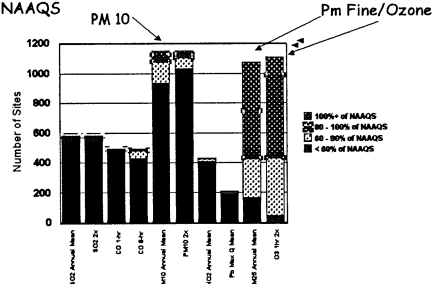
## Monitoring Program...Administration process...resource flow



## Why Do We Need a New Strategy?

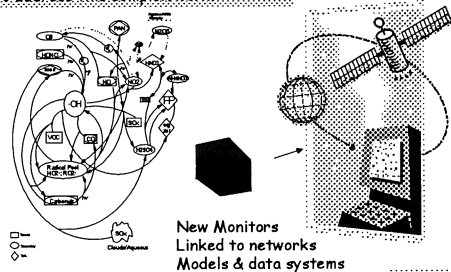
### Common sense initiative

Most criteria measurements (except O3, PM2.5) well Below NAAQS



## Why Do We Need a New Strategy ?

Progress in science and technology to address this complex work.



## Principal Recommendations

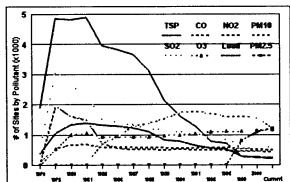
- ◆ Need insightful measurements to ensure the \$\$\$ allocated for emission reductions are effective.
  - Enhanced real-time data delivery to public
  - Increase capacity for hazardous air pollutant measurements
    - Future predictions suggest air toxics pose collectively greater risks than criteria pollutants
  - Increase in continuous PM measurements
  - Support for research grade/technology transfer sites
- ◆ Multiple pollutant monitoring must be advanced
  - Air quality is integrated through atmospheric processes, health/eco effects, emission sources.
- ◆ Technological advances must be incorporated
  - Information transfer technologies
  - Continuous PM monitors
  - High sensitivity instruments to address today's (and later) low levels
  - Model-monitor integration must advance to effect benefits for both tools

## Principal Recommendations

- ◆ Reallocate monitoring resources from "low-value" criteria measurements to new priorities (HAPS, Fine Particles, etc).

- Level of realignments

- Minor (O<sub>3</sub>, PM<sub>2.5</sub>) ...Create a sustainable network
- Substantial (PM<sub>10</sub>, NO<sub>2</sub>, CO, SO<sub>2</sub>)...focus on real environmental benefit.



Network  
Evolution  
1970-2001

7

## Principal Recommendations

- ◆ Revise National monitoring networks through NCore

- Emphasis on multi-pollutant monitoring, continuous and information transfer technologies
- Modest initial \$ required to catalyze change

- ◆ Ensure stability and flexibility for States, local agencies and Tribes

- ◆ Modify monitoring regulations to facilitate change

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## Key principles

- ◆ Partnership...now with Grantees (States, locals, Tribes)

- Oversight through the National Monitoring Steering Committee (NMSC)
- Expansion to other agencies, private sector sponsored studies

- ◆ Balance between national and local needs

- Increase/maintain flexibility for S/L/Ts
- Ensure capable of addressing national level needs

- ◆ Near "zero" sum assumption in resources

- Maintain long term viability of monitoring agencies
- Near term-work within current resource framework

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## How & Who does this benefit?

- ◆ State and local agencies

- More focused operations, increase relevancy and flexibility and products

- ◆ Tribes

- Provides integration/partnering opportunities

- ◆ Public

- Faster and more comprehensive data delivery creates a more informed public

- ◆ EPA

- Stability/consistency in data for major national programs

- ◆ Science community

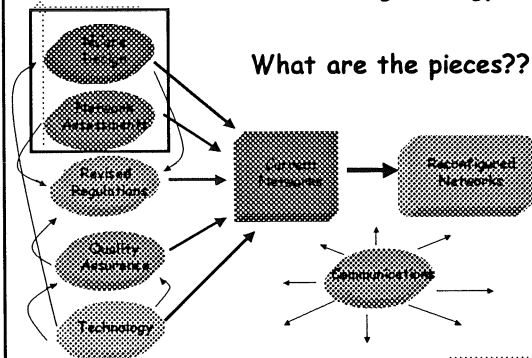
- Enhanced integration with national networks
- Increase in continuous and multi-pollutants data sets

- ◆ Other agencies and organizations

- Commonality in data needs...
  - Fosters efficient networks and use of data

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## National Ambient Air Monitoring Strategy



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## Workgroup structure

- ◆ National Monitoring Strategy Committee

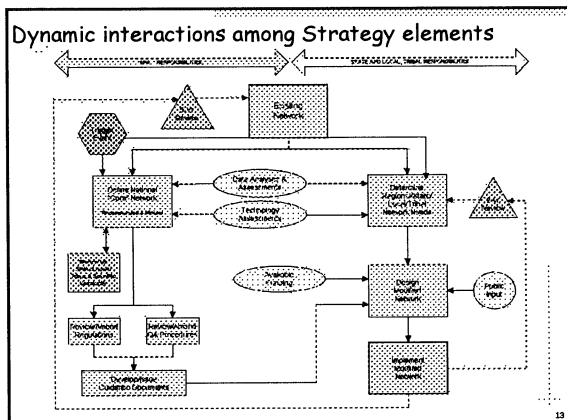
- ~ 15 reps for EPA, States, local agencies and Tribes
- Consensus, strategy formulation, strategy approval

- ◆ Three technical workgroups

Address more substantive implementation elements

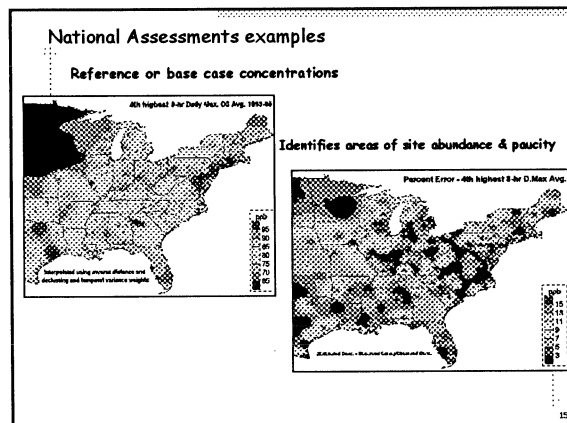
- Regulations
- QA
- Technology

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### Network Assessments

- ◆ **Emphasis on value of current networks**
  - Identify redundancy, low "value" monitors
- ◆ **Initial National Assessment**
  - Catalyze more specific regional work
  - Provide a "reference" and data source
- ◆ **Regional level assessments**
  - Determine actual network modifications...
  - Beyond "network reviews"
  - Region 5/LADCO.....model example
  - Workshop...9/03...Region 4
  - Iterative....



### Summary of National Assessment Results

- ◆ **Ozone**
  - Limited Reductions Nationally (5 - 30%) With an Emphasis on Relocation to Enhance Mapping, Rural/Regional Concentrations, Possible Increases to Assist in Coverage in Southeast and Texas, investment in air toxics.
- ◆ **PM2.5 FRM**
  - Moderate Reductions (20-30% to ~ 800 Sites) "After designations" Coinciding With a Shift to Continuous Methods for AQI/Mapping; Eventual 500 Site (or Smaller) Network Following Successful Demonstration of Cont. Methods
- ◆ **PM10**
  - Major Reductions From 1600 Site Network (1996) Dependent on Regional/State Rqmts; resource shift toward PM<sub>2.5</sub>.

### Summary of National Assessment Results (Cont)

- ◆ **CO, NO<sub>2</sub>, SO<sub>2</sub>**
  - Major Reductions for NAAQS Purposes; Switch to Representative and High Sensitivity Techniques for Model Evaluation, Build Into New Core Sites, investment in air toxics
- ◆ **Lead**
  - Declare Victory!...Minimal Trends...emphasis as a HAP Metal
- ◆ **PAMS**
  - Restructure. Reduce "Minimum" Requirements.
- ◆ **Regional/local assessments due March/03**
  - supercede National results
- ◆ **Divestments invested in priority areas (e.g., air toxics)**

### National Core Network: NCORE

- ◆ **Goal: Move from loosely tied single-pollutant networks to coordinated, highly leveraged multi-pollutant networks with real time reporting capability**

### Principal Data Objectives of NCore

- ◆ Public Information
  - Real-time Input of Data From Across the Country Using Continuous Technologies
  - Spatial Mapping (E.G., AIRNOW), Health Advisories
- ◆ Health/Exposure Assessment Support
  - Input for Periodic NAAQS Reviews
- ◆ Emissions Strategy Planning  
(Emphasis on Initial Timeframe)
  - What are the best emission reduction approaches?
    - E.g., Provide for Routine Model Evaluation and Source Attribution

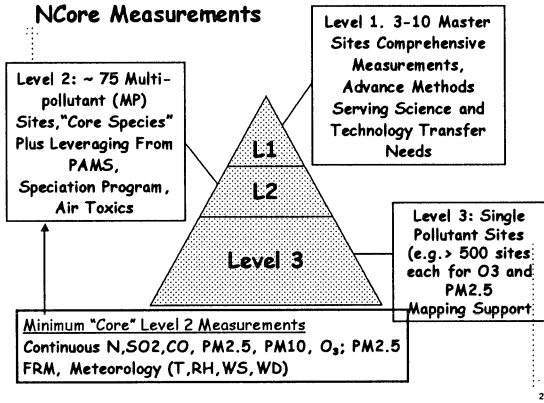
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### Principal Data Objectives of NCore

- ◆ Air Quality Trends and Program Accountability
  - Does the monitoring confirm strategies are working?
  - Major National Initiatives (Acid Rain, Clear Skies, NOx SIPs, FAVCP)
  - Including HAPS (National) and Visibility Assessments
- ◆ Science Support
  - Backbone for More Diagnostic Level Work (Same for Local SIPs), Health Studies
- ◆ NAAQS Determinations and Related Regulatory Rqmts.
  - Emphasis on More Pervasive Ozone and PM2.5

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### NCore Measurements



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### NCore Measurements, cont.

- ◆ Leveraging to obtain multipollutant measurements
  - E.g., new NATTS (air toxics trends) located at PM2.5 chemical speciation (subset located at PAMS)
- ◆ Assume multiple measurements provide a synergistic addition to interpretive value of data sets
- ◆ Key species (even at trace levels)...C,N,S that are of universal importance for atmospheric sciences (model evaluation and SA); health effects/standard setting, and air management...accountability
- ◆ Practical element of technology constraining NCore2
  - e.g., true NO<sub>2</sub>, cont. NH<sub>3</sub>, HNO<sub>3</sub>
- ◆ NCore2 is a *proposal*, expecting refinement
- ◆ NCore1 .....resource issues

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### NCore Measurements, cont.

(Hydrocarbon measurements/PAMS)

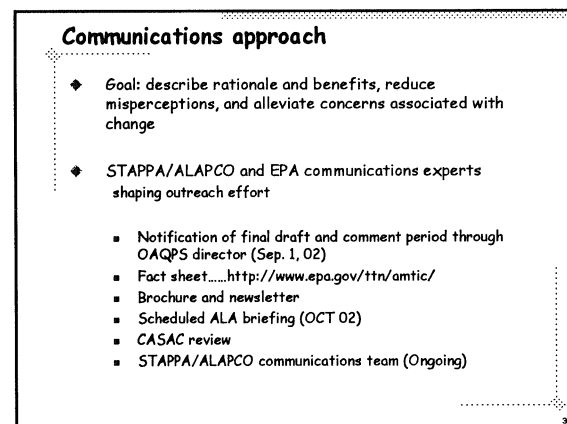
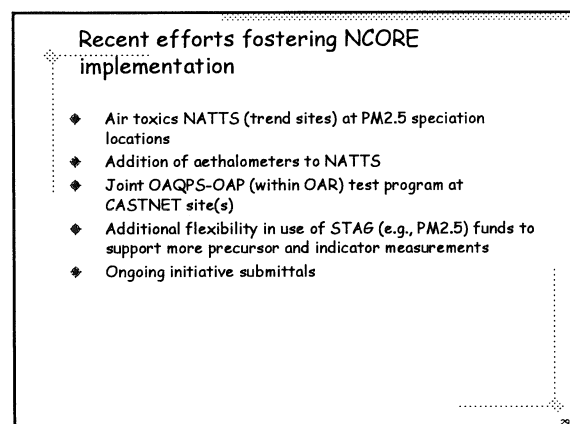
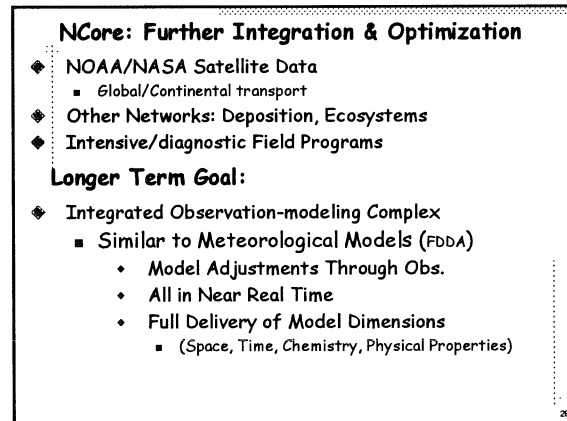
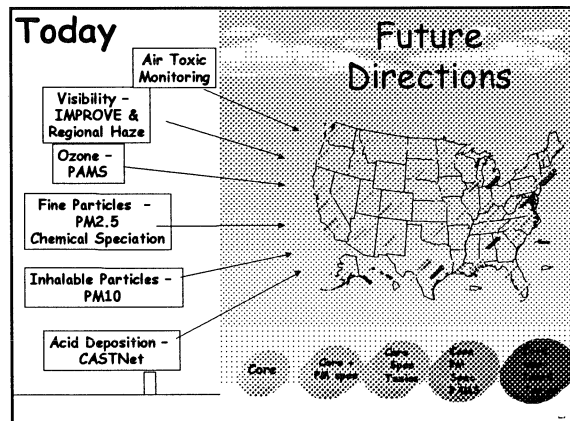
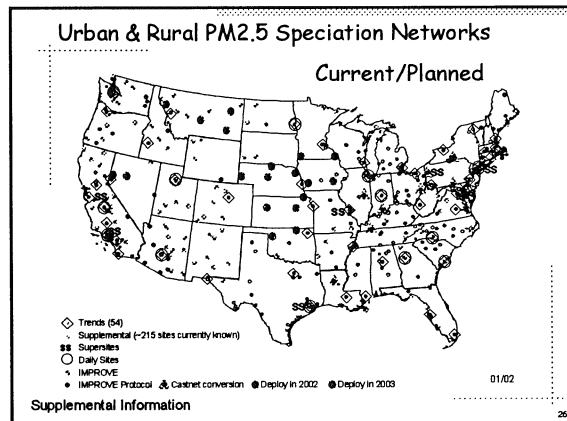
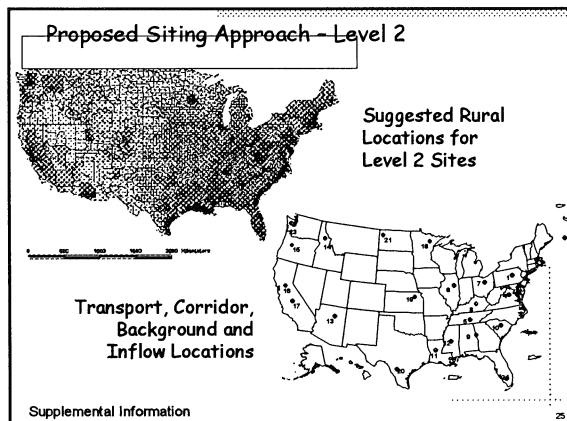
- ◆ Lacking specific recommendations for routine VOC
  - Implicit assumption covered through PAMS (and toxics)
- ◆ PAMS
  - poor utilization of PAMS data
    - technology, data analysis resource issues
    - "too removed" from end product
      - Relative to PM speciation and air toxics data
      - Challenge to NCore objectives
  - Inadequate attention to nitrogen
  - Recommended changes:
    - Reduction in required speciated VOC (2 sites per area)
    - NOy requirement (more rural locations)
    - CO required..
  - Consider year round sampling
- ◆ Rural/regional measurements
  - Measurement and programmatic challenges

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### Proposed Siting Approach - Level 2

- ◆ "Representative locations"
  - 5-15 km urban scale
  - 50 km or more...regional scale
  - "contrast with historical search for highest concentrations...at odds with collocation"
- ◆ Start With "Reasonable" Coverage From Health/ Exposure Perspective
  - Population Based (Range of Sizes) With Varying Chemical Composition.
  - Assumes Need for Multiple Pollutants to Tease Out Confounding Factors
- ◆ Add in Desired Rural Coverage for Accountability (Major National Programs Such As 3P, NOx SIP) and "Operational" Model Evaluation
- ◆ Equitable Resource (and Constrained) Considerations
- ◆ Determine Ability of Existing Networks to Address, Modify Supplemental Information

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## Issues

- ◆ **Resources**
  - No identified \$ for Level 1 sites .. \$2-10M (or >) per year
  - Level 2..Modest *initial*/capital investment~ \$8-20M
    - ITT, new instruments (high sensitivity)
  - Training
    - Labor/field orientation to data base/analysis
- ◆ **Network assessments ..removing monitors**
  - Policy conflicts, e.g.,
    - Prior agreements...SDPS, NSR, other
    - Monitor located in designated nonattainment area
    - Reliance on continuous methods (in place of integrated) for regulatory applications
  - Public/community/public health protection perception
    - DNR/RA/ABY
- ◆ **Tension associated with balancing between rigorous methods and accommodating new technologies**
- ◆ **Generating consensus and progressing ...given variety of interests, stakeholders, and complex infrastructure**

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## Schedule

- ◆ **Document**
  - 9/02 Draft Final for public comment
  - 9/02 - into 2003 comment period
  - 4/03 - 12/03 NMSC review and final document
- ◆ **CASAC Review...**
  - 4/02- 10/03?
- ◆ **Regional Network Assessments**
  - 10/02 - Draft
  - 9/03...EPA RO network assessment meeting
  - 10/03 - final
- ◆ **Monitoring Regulations Goals**
  - 11/03...Proposal to NMSC
  - 12/03...to EPA
  - 3-6/04.....public comment
- ◆ **Extended outreach, integration and deployment**
  - 2003 - 2007

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**Air Monitoring Section  
Air and Radiation Division  
Region 5**



- Identify low value and high value PM<sub>2.5</sub> monitoring sites
- Provide States with informational support for their own proposed network redesign
- Complement national network assessment by providing finer local-scale resolution



- All available AIRS data for FRM PM<sub>2.5</sub>
  - Region 5 and bordering states
- Summarized site information
- Created a site map
- Calculated summary statistics
- Performed correlation analysis



**Species Common Occurrence of 1980s**

- Herring, M to Wisconsin Bay, WI (32)
- Yellow Perch, MI (12)
- ▲ Rock Bass, MI (1)
- ◆ White Perch, Lake Huron, WI (2)
- ✕ Rock Bass, MI (2)
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**Legend**

- Herring
- Yellow Perch
- ▲ Rock Bass
- ◆ White Perch
- ✕ Rock Bass
- ✚ Rock Bass
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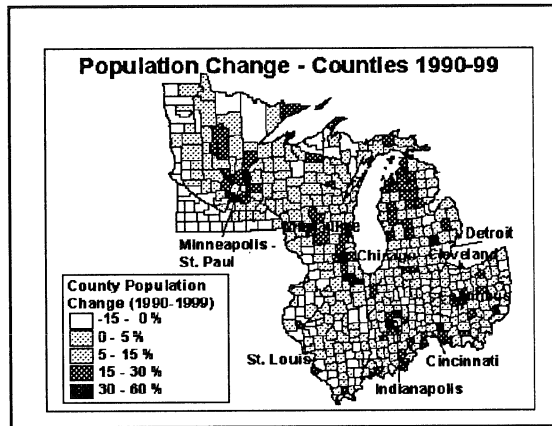
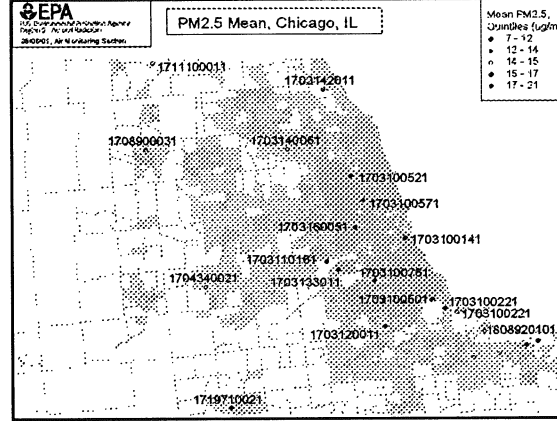
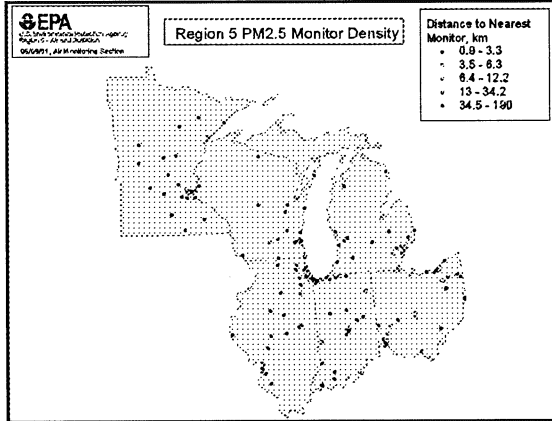
- We evaluated Region 5 PM<sub>2.5</sub> monitors on the basis of four decision criteria:
  - correlation
  - monitor density
  - mean concentration
  - population change
- The "least value" monitor would be one highly correlated to others ( $R^2 \sim 0.95$ ), close to other sites, showing low means, and located in area of decreasing population



Figure 7. *As in Figure 6, but for R, the maximum correlation to any other monitor.*

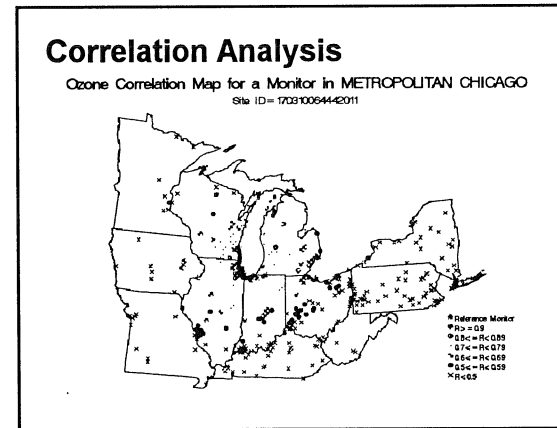
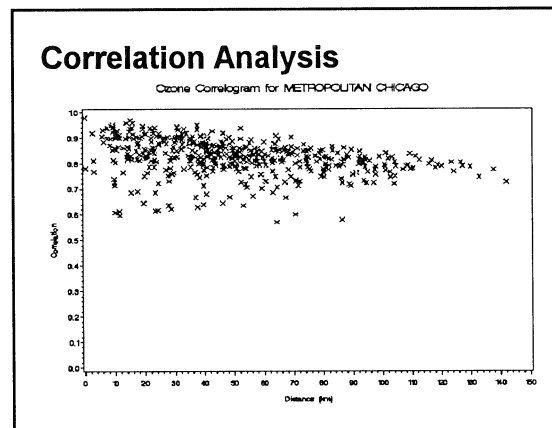
Maximum Correlation to Another Monitor (R)

- NA
- 0.79 - 0.902
- 0.903 - 0.950
- △ 0.951 - 0.953
- ◐ 0.954 - 0.988
- ★ 0.989 - 0.999



## Ozone Analysis

- Correlation Analysis
  - Determine "redundant" monitoring sites
  - Preserve "unique" sites
  - Data
    - 1996-2000 8 hour daily maximum ozone concentration
    - IL, IN, OH, MI, MN, WI, IA, MO, KY, WV, PA, NY
- Positive Matrix Factorization (PMF)
  - Group monitors by spatial factors
  - Examine areas with similar ozone concentrations





### Correlation vs. Ratio of Ozone Measurements for METROPOLITAN CHICAGO

Maximiliano Varela y sus hijos en 1870

4016-55 0, 5, 10

## Examples of two spatial factors



### Uniqueness Metric for Gene Factor Analysis



Mean Percent Change for Czone: Summer 1996–2000



- "Bottom-Up" Network Assessment

1. *Journal of the American Medical Association*, 1997; 277: 1001-1005.

## The Goal



"Top-Down" and "Bottom-Up" meet in the middle

- Implement changes in networks over period of up to five years

## Where We Are Now

- Phase I: "Fine pruning" by States COMPLETE (~ 3 months)
- Phase II: Thorough assessment of networks resulting in initial revisions COMPLETE (~ 6 months)
- Phase III: Review by technical and regulatory staffs at both Regional and State level to see if data needs met COMPLETE (~ 3 months)
- Phase IV: Approval of proposed networks by State Air Directors IN PROGRESS (Approved by 4 of 6 States)
- Phase V: Outreach to public to explain changes IN PLANNING STAGES

## Outcomes

- Regional approach
- Implement changes in networks over period of up to five years
  - Many States have begun implementation
- Monitoring staffs need to work extensively with regulatory/designation staffs at both Federal and State levels
- Overall: 24% reduction in criteria pollutant networks
  - ozone: 14%      CO: 25%
  - PM2.5: 18%      SO2: 33%
  - PM10: 36%      NO2: 14%
  - Lead: 48%

## Designations

- Definition
- Factors
- Process

"Nonattainment" areas can be found on the web and listed in the Green Book.

## Definition of a Nonattainment Area

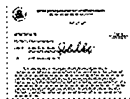
### Sec. 107(d)(1)(A)(I) Designations

"...any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant."

### What guidance has EPA issued ....

#### EPA's Designation Guidance

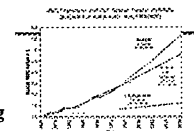
- 3/28/00 Seitz memo – "Boundary Guidance on Air Quality Designations for the 8-hour Ozone NAAQS" (technical factors)
- 7/18/00 Seitz memo - "Guidance on 8-Hour Ozone Designations For Indian Tribes" (technical factors)
- 2/27/03 Holmstead memo - "Extension for States and Tribes to Submit Recommendations etc" (date to send recommendations)
- 4/1/03 Holmstead memo ... "Designations for the Fine Particle National Ambient Air Quality Standards" (technical factors and date to send recommendations)
- Technical information:  
<http://www.epa.gov/ttn/naaqs/ozone/areas/>  
[http://www.epa.gov/ttn/naaqs/pm/pm25\\_index.html](http://www.epa.gov/ttn/naaqs/pm/pm25_index.html)



### EPA's Guidance factors to consider for designations ... PM and Ozone

#### Similar Designation Factors

- Presumption – entire consolidated metropolitan area if monitored violation in any county
- Air quality in area, adjacent areas, and region
- Emissions/sources in area and nearby areas—location, size, level & degree of control—check for contribution to a violating area or violating rural county downwind
- Population and urbanization—expected growth (rate/pattern/extent), commuting patterns, vehicle miles traveled



### EPA's Guidance on Designations Similar Technical Factors con't

- Meteorology—weather & transport pattern
- Geography/topography—mountains or other air basin boundaries
- Jurisdictional boundaries
- Regional emission reductions (ozone)
- Also useful—air quality modeling, data interpolation techniques, back trajectory & source apportionment analyses



## Timelines for 8-Hour Ozone and PM2.5 Implementation Programs

Action	Ozone	PM2.5
EPA proposes implementation rule	June 2003	Fall 2003
States/Tribes recommend designations	July 2003	Feb. 2004
EPA responds with letters describing intended "modifications"	Oct. 2003	July 2004
EPA finalizes implementation rule	Dec. 2003	Fall 2004
EPA finalizes designations	April 2004	Dec. 2004
State plans due	April 2007	Dec. 2007*
Attainment dates	2007-2021	2009-2014

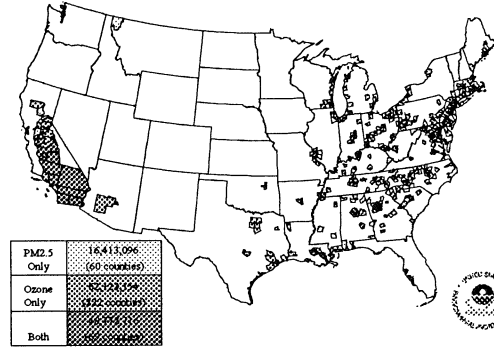
\* Regional haze SIPs will be due at the same time that PM2.5 SIPs are due.

## Common PM and Ozone Metropolitan Problem Areas Include....

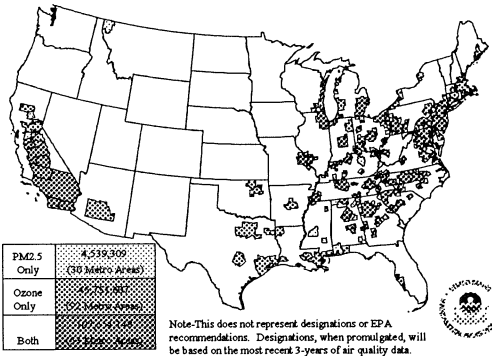
- Los Angeles
- San Diego
- Fresno
- Chicago
- St. Louis
- Detroit
- Nashville
- Knoxville
- Memphis
- New York
- Philadelphia-Wilmington
- Cleveland
- Pittsburgh
- Cincinnati
- Washington-Baltimore
- Charlotte
- Atlanta
- Birmingham



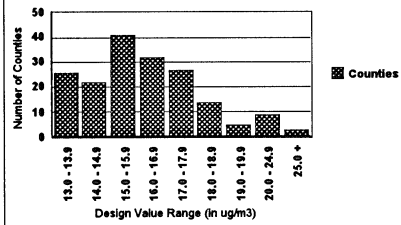
Looking at counties ... Counties With Violating Monitors for 8-Hour Ozone and PM2.5 Standards (based on 1999-2001 data)



Looking at areas ... Metropolitan Areas With Violating Monitors for 8-Hour Ozone and PM2.5 Standards (based on 1999-2001 data)



1999-2001 PM2.5 Design Values



### Key Points

- 29 counties with violating monitors
- 41 counties between 15.0 and 15.9 ug/m3

## NHEERL Perspectives on NAAMS

Staff Remarks:  
Clean Air Scientific Advisory Committee (CASAC)  
National Ambient Air Monitoring Strategy (NAAMS)  
Subcommittee  
July 8, 2003

## Overview

- Coordination on NAAMS
- Key issues
- Perspectives

## Coordination

- Coordination with OAQPS (Leon Walsh, Lucas Neas)
- Input to Strategy
  - Air Quality Monitoring in Support of Epidemiology (Lucas Neas)
- Highlight activities and potential issues to NCER PM Centers Program, external researchers

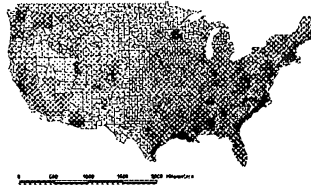
## Key Issues for Health Studies

- Population Considerations in Epidemiology
- Temporal Considerations
- Implications of decommissioning sites
- Importance of PM Speciation and co-pollutant measurements
- Capacity for integrated measurements
  - Hi Volume samplers

## Population Considerations in Epidemiology

- Many epidemiologic studies have relied entirely on routinely collected air quality data supplied by a compliance-oriented air quality monitoring system
- Need identification of sufficient geographic detail to permit accurate long-term community-level exposure estimates

Figure 1: Population-based Air Quality Regions



## Epidemiology Study Types and Monitoring

> Different epidemiologic study types require differing exposure assessment needs

Summary of air quality monitoring requirements by type of epidemiologic study:

	Uncensured Open Cohort "Time Series"	Closed Cohorts with repeated measurements "Panel Studies"	Closed Cohorts analyze for cumulative incidence "Panel Studies"	Closed Cohorts analyze for cumulative incidence (survival)
Frequency	Daily	Hourly	Hourly	Monthly
Duration	Years to Decades	Weeks to Years	Years	Decades
Geo. Scope	Urban Centers	Limited	Urban Centers	U.S. Population
Geo. Detail	County	Study site	County	Regions

## Temporal Considerations

- Daily measurements of PM most useful for health studies
  - Mortality
  - Hospitalizations
- Hourly pollutant data valuable
  - Health data related to "Panel Study" designs
- Monitoring system coupled with modeling system for generation of air quality surfaces
  - Imputation of data between widely spaced monitors
  - Imputation of data for less frequent measurements (e.g., every third day or every sixth day)

## Implications of Decommissioning Sites

- Strong communications across Agencies and scientists needed
  - Process to identify and link health scientists to decision makers needed
  - Coordination with on going or planned studies needed (e.g., AZ PM site.. inner city asthma)
- Coarse particle measurements still needed to support health studies

## Speciation at Selected Sites

- Valuable for epidemiological studies to evaluate "hazardous PM components"
  - Source apportionment to investigate sources-to-effect linkages
- Incorporation of air toxics sites welcomed
  - Limited ambient data for air toxics studies
  - Characterize Hot Spots

## Capacity for Integrated PM Measurements

- Value of filter based measurements
  - Detailed analysis
  - In vivo and in vitro studies of causal agents
- Capacity for important high volume PM sample collections
  - Coherence: toxicological, clinical, and epidemiological studies
  - Investigate source or airshed related toxicity differences

## NHEERL Perspectives

- Providing data for health studies related to NAAQS review are one many NAAMS objectives
  - Level 2 & 3 are of the greatest value for health studies
    - Level 2 sites valuable for investigations of hazardous components, support for source apportionment, gases
    - Level 3 population based; supports national extrapolation
  - Level 1 measurement insights

NCORE Measurements

